DEC STD 003-0 Hardware Documentation Standard

DOCUMENT IDENTIFIER: A-DS-EL00003-00-0000 Rev E, 22-Oct-1990

ABSTRACT: This standard establishes worldwide requirements for consistency, completeness, and usability of Digital hardware documentation.

APPLICABILITY: This standard is to be used by all organizations that publish and/or produce technical documentation for Digital hardware products.

STATUS: APPROVED 22-Oct-1990; use VTX SMC for current status.

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Preface

Purpose

The purpose of DEC STD 003-0 is to establish requirements for consistency, completeness, and usability of Digital hardware documentation, worldwide.

Audience

All organizations that publish or produce documentation for Digital's hardware products must use this standard.

Scope

This standard describes the development and content of field and customer hardware documentation, not the packaging. For packaging specifications, *DEC STD 073-0 Manufacturing and Packaging for Publications* must be adhered to.

Note that DEC STD 003-0 does not apply to internal engineering, manufacturing, or sales documentation.

Appendix D lists other Digital standards and publications related to hardware documentation. Publication groups should follow these standards.

This standard primarily addresses hardcopy documentation, but most of the information also applies to online documentation.

This standard does not address software that is not related to a specific piece of hardware.

This standard should be used with any other applicable standards when establishing specifications for vendor-prepared documents.

Organization

This standard is divided into four chapters and five appendices.

- Chapter 1 provides an overview of the documentation process.
- Chapter 2 covers general concepts: parts of a manual, style, illustrations.
- Chapter 3 defines the specific types of hardware documentation and provides a typical content outline for each type.
- Chapter 4 describes the different methods for updating hardware documentation.
- Appendix A lists sample Release Notes and Updates.
- Appendix B provides information on the DEC STD 003 waiver process.
- Appendix C provides a sample outline for the "Using the Hardware" section of different product types.
- Appendix D lists referenced documents.
- Appendix E lists related documents.

Conventions

Throughout this standard, the terms *documentation set* and *information set* are synonymous. Also, throughout this standard, the term *hardware* does not apply to microcode, unless otherwise stated.

DEC STD 003 Advisory Committee

The following persons were members of the DEC STD 003 Advisory Committee and worked diligently on the revision of this standard.

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CHAPTER 1

PLANNING YOUR DOCUMENTATION

This chapter provides an overview of the documentation process and covers important topics to consider before you begin writing.

- Security of information
- Internationalization and translation
- Testing the information
- Publishing information

Your documentation plan should address each of the above issues.

This chapter also addresses third-party buyouts.

1.1 Overview of the Documentation Process

The documentation development process relates directly to the *DEC STD 028-0 Phase Review Policy* and EL-CP356-00, *Corporate Phase Review Process Guide*. The typical documentation process involves four major stages: define, design, develop, and deliver.

Table 1 shows when the documentation stages occur in the engineering phases. The table lists the tasks performed at each stage. The Publishing group should include all relevant groups in the review of major actions: Engineering, Customer Services System Engineering (CSSE), and International Engineering Development (IED).

Most documentation groups have a template for documentation plans. Check with your documentation group for the latest template.

Table 1: Documentation Development Stages

Engineering		Documentation	
Phase	Action	Phase	Action
0	Identify the solution to a customer need. Examine the impact on corporate resources. Measure the financial potential of the product. Specify audience for documentation.	Define	Assign a project manager. Create a project file. Identify tools, resources, and standards. Assess needs by analyzing audience, job, and task. Read, analyze, and interpret engineering plans Determine the product maintenance philosophy. Define deliverables.

Table 1 (Cont.): Documentation Development Stages

Engineering		Documentation	
Phase	Action	Phase	Action
	Develop a plan supporting customer needs.		Produce a general outline of information categories. Develop a preliminary budget, schedule, and documentation plan.
1	Write functional specification, preliminary product design, and engineering development plan.	Design	Write detailed outlines of information sets.
2	Complete the product design and internal prototypes. Review documentation drafts	Develop	Develop, test, review, and modify prototype information sets. Produce enhanced prototypes for preliminary deliverables (such as field test documentation.) Test and modify into final deliverables.
3	Qualify production-level prototypes.	Deliver	Complete, verify, and validate the final deliverables.
4	Ramp up to produce the desired volume.	Deliver	Complete validation of information sets. Monitor distribution. Perform a postproject review. Archive the information sets. Conduct a client satisfaction survey. Maintain information files. Produce updates and maintenance releases.
5	Phase down the product.		

1.2 Responsibilities

The Publishing group prepares a documentation plan for a hardware product based on information from Engineering and Customer Services. For all products, the plan must describe how the documentation will meet internationalization requirements and what support the documentation group will supply for localization. The following sections describe the related responsibilities of Engineering and Customer Services.

1.2.1 Engineering

The Engineering group for a product must provide the Publishing group with the necessary source information and resources to prepare the documentation. Resources include prototype equipment and personnel to answer questions. Engineering is also responsible for reviewing the technical accuracy of information in each hardware document.

Typically, Engineering provides the Publishing group with the following:

- A functional specification
- Open invitation for writers to attend engineering and product development meetings
- Access to the engineering design database for illustrations
- Timely notification of engineering update information
- Suggestions of user and maintenance procedures appropriate to the product and the documents

- Active, thorough, and timely reviews for draft manuscripts
- Active and timely responses to writers' requests for information
- Timely access to prototype hardware

1.2.2 Customer Services System Engineering (CSSE)

Customer Services Systems Engineering prepares a Customer Services Plan that outlines the service delivery strategy for the product. CSSE is responsible for ensuring that hardware documents meet the requirements of the CSSE Plan. CSSE's responsibilities are similar to those of Engineering. Typically, CSSE provides the documentation group with the following:

- Timely notification of engineering update information
- Active, thorough, and timely reviews for draft manuscripts
- Verification for installation, removal and replacement, and test procedures
- Active and timely responses to writers' requests for information

1.3 Security of Information

The security of information is very important to Digital's success in business. When working on unannounced products, writers must protect source files and mark draft documentation with the same level of security as an engineering specification or drawing. If final documentation is for internal use only, it should also be marked appropriately. Hardware documentation must adhere to *DEC STD 128-0 Security Classification for Engineering Intellectual Property - Policy and Regulations*, which specifies the appropriate security levels.

Responsibilities

Groups preparing hardware documentation have the following responsibilities concerning security:

Engineering, Product Management, and Publishing	Decide on the security level for each final document in the documentation set.
Project leader	Lists the security level for each document in the documentation plan.
Writer	Marks each document with the appropriate security level, according to DEC STD 128-0.

1.4 Internationalization and Translation

Hardware documents are often translated and localized for different countries. Even if manuals are not translated, they are used worldwide by readers who use English as a second language, including Digital Customer Services personnel. Therefore, all products should be designed for an international audience, regardless of whether the product is an international product.

Producing International Products (PIP) includes a set of comprehensive handbooks on preparing products for an international audience. Writers should be familiar with the contents of the PIP *User Information Handbook*. That handbook provides an overview of how products are selected for translation.

Translation requirements for product documentation are defined in *DEC STD 064-0 Compliance with International Language Requirements*.

1.4.1 Organizing Content for an International Audience

A writing group usually receives internationalization requirements from International Engineering Development (IED), General International Area (GIA), or local engineering groups. The writing group may also receive customer requirements from Marketing. Product management is responsible for the final set of requirements. These requirements can place restrictions on the way an information set is organized.

For example, suppose a local engineering group decides to translate only the operator information because Digital Customer Services will handle installation. In that case, the operator and installation information types cannot be combined and bound together.

The information in a document must be unambiguous and concise. Make sure the information is applicable worldwide. For example, if a product is considered user-installable in the U.S., make sure it is user-installable worldwide. Remember that English language documentation will be used in at least four countries.

1.4.2 Country-Specific Information

Some information in hardware documents may apply only to certain countries or areas. Place country-specific information where it can be easily extracted or modified. Untranslated manuals must also comply with the market requirements of a country.

The following areas of a hardware document may contain country-specific information. See Section 2.2 for more details.

- Copyright page
- Reader's comments card
- Regulatory agencies' safety requirements
- Cabling and power requirements
- Information transfer and local telecommunications (including modems)
- Parts ordering procedure
- Remote diagnostics information
- Service information
- Specifications

Scattering country-specific information throughout a document makes it difficult to update translated editions. Either place this information in a separate section for easy extraction, or supply all variants of the information. For example, in an installation section, you might show all the variations of power cords.

1.4.3 Recommended Strategies

The following list provides some recommended strategies for internationalizing documentation. See the PIP handbooks for detailed information.

- **Modularity and Core Text**

  A modular approach ensures that country-specific information is organized in one place.

  Developing core text allows translation groups to translate common information once for a family of products or operating environments. For example, the description of a TK70 tape drive should be very similar if not identical in the documentation across a range of workstations.

- **Examples**

  You should test and validate examples to ensure that they work with all product variants.

  Examples should be internationally applicable. Do not use culture-specific references.

- **Metrics**

  Follow *DEC STD 015-0 Abbreviations and Units of Measurement* and the PIP guidelines. Use the applicable ISO abbreviations and unit symbols, such as Hz for Hertz.

- **Writing and Graphic Tools**

  Use only supported tools that fulfill internationalization requirements.

  For consistency, publishing groups should use a minimum number of standard formats and formatting tools. Some tools generate boilerplate text that requires translation. For example, VAX DOCUMENT generates text for a copyright page. The boilerplate text for standard formats is already translated, so you should use these formats.

- **Text Expansion After Translation**

  Text size may expand by as much as 100 percent when translated. Text expansion can affect the layout and format of a document. Translators try to preserve the original coding of the electronic publishing tool used for the English version. However, text expansion sometimes make recoding inevitable. You can reduce the amount of recoding required by following these guidelines:

  – **Illustrations**

    Allow space for text expansion when preparing illustrations. Do not enclose text in boxes. Use as little text as possible.

  – **Titles, headers, running headers and footers**

    Leave room for text expansion where possible.

  – **Tables**

    Tables with narrow columns are a problem in translation. Try to avoid tables that have more than five columns; narrow columns cause excessive hyphenation in the translated version.

1.5 Testing Your Information

Hardware documentation requires three forms of testing:

- Content review, to ensure technical accuracy
- Validation testing, to ensure accuracy of procedures
- Usability testing, to ensure ease of use for the target audience

1.5.1 Technical Content Review

A content review ensures that information is technically accurate and up to date. The review also allows writers to incorporate new information gathered from field tests of prototype products.

Responsibilities

Writer	Provide Engineering and CSSE with draft documentation for review. Hold a review meeting and incorporate the changes received.
Engineering and CSSE	Review draft documents for technical accuracy. Provide updated information, including changes from field tests.
Project leader	Ensure that the documentation is updated before it is released.

1.5.2 Validation Testing

Validation testing, also called verification, ensures the accuracy and completeness of documented procedures. Examples of procedures are instructions for operation, removal and replacement, and installation.

Note that testing may need to be repeated for a local-language version of the product. You should preserve your tests and test procedures for use by local engineering groups.

Have someone other than the writer perform each procedure with the appropriate equipment. The tester should be as knowledgeable about the product and the procedures as the intended audience. The writer(s), illustrator(s), and editor(s) should observe the testing.

Responsibilities

Engineering	Supply equipment and technical resources for validation.
Writer	Observe and record any documentation or procedure errors discovered during testing.
	Incorporate information from the test into the documentation.
Documentation project leader	Ensure that the documentation is updated before it is released.

1.5.3 Usability Testing

A usability test helps determine if documentation is appropriate and easy to use for the target audience. Test participants unfamiliar with the product are asked to perform a selected task, using only the documentation for assistance. The participants must accurately represent the target audience.

Usability testing can be organized and run by:

- Quality Assurance Consultants
- Human Factors Engineers
- Documentation team members who are knowledgeable and experienced in this area

The writer, editor, and illustrator on the project team should observe the usability testing. Additional observers and reviewers might include the subject matter experts and the funder.

Usability testing should occur early enough in the documentation process so that test results can be incorporated into the documentation.

Responsibilities

Test organizer	Record test observations and information relevant to the accuracy, completeness, and usability of the documentation.
	Summarize this information in writing and submit it to the writer.
Writer	Incorporate this information in the documentation.
Project leader	Ensure that the documentation is updated before it is released.

1.6 Publishing Information

In general, hardware documentation is printed, stocked, and distributed by the Publishing and Circulation Services (P&CS) group. For some products, the engineering group may want to print and stock the documentation at another international distribution center or near the product's manufacturing site. If a hardware document is going to be kitted with software documentation, the Software Supply Business (SSB) orders copies from P&CS. Documentation for European use is printed by European Software Supply Business (ESSB) in Galway. ESSB follows the same part numbering procedures as SSB.

1.6.1 Packaging and Binding

Hardware documentation must adhere to *DEC STD 073-0 Manufacturing and Packaging for Publications*, which describes the material specifications for each document used in producing and manufacturing documentation. The audience for DEC STD 073-0 includes documentation, manufacturing, purchasing, and production personnel, as well as release engineers and new product planners.

The standard lists the specifications for different types of documentation and media, such as manuals, cards, release notes, CDROM, and posters. The standard also includes sections on paper, drilling, ink, binding, covers, and tabs.

1.6.2 Part Numbers

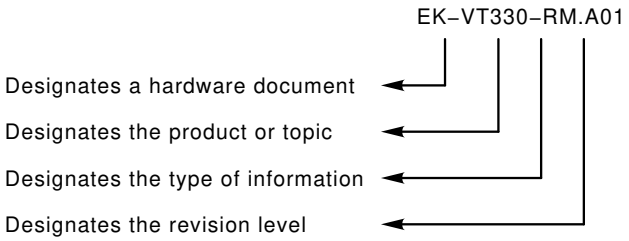
P&CS assigns part numbers for hardware documentation. Documents that will be kitted by SSB receive special part numbers.

Standard Part Number

The writer should send requests for standard part numbers to the P&CS Inventory Control Clerk. Include the following information in the request:

Suggested part number
Document title
Your name, DTN, and location

Hardware documentation must use the standard part number, which has four fields in a 2-5-2.4 format, as defined in *DEC STD 012-0 Part Identification Standard*. Check DEC STD 012-0 for information on how to present part numbers to customers and on title pages.



The third field is a two-letter code that designates the information type of the document. Chapter 3 describes all the information types for hardware documentation. Table 2 lists the codes used for each information type. See Chapter 4 for the codes used with updates and addenda.

Table 2: Part Number Codes for Hardware Information

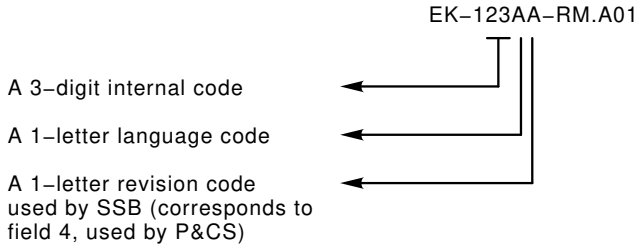
Information Type	Part Number Code
Documentation kit. Includes one or more of the following:	DK
Hardware Concepts	HC
Site Preparation	SP
Installation	IN
Upgrade Installation	UI
Operator	OP
Servicing	SV
Programmer's Reference	PR
Technical	TM
Proprietary Technical	PM
Illustrated Parts Breakdown	IP
Combined Types	
Site Preparation, Installation, and Operator	OM
Servicing and Technical	MS

Software Supply Business (SSB) Part Numbers

Hardware documents that are kitted with software documents receive a special number used by the Software Supply Business (SSB) group. P&CS also assigns this part number. To request an SSB part number, contact the P&CS Inventory Control Planner. Include the following information in the request.

Document title and information type
Your name, DTN, and location

The SSB part number also has four fields in a 2-5-2.4 format, as required per DEC STD 012-0. Only field 2, which indicates the language of the document, differs from the standard part number. P&CS assigns the information in field 2. You only have to provide the information type for field 3 (Table 2).



1.7 Third-Party Buyouts

Some products sold by Digital are third-party buyouts. Digital negotiates to buy another company's product and sell it as a Digital product.

Ideally, the negotiations should include the creation of documentation for the product. Digital should encourage the third party to use DEC STD 003 as a basic guideline. Other Digital standards to be used include the following:

Standards
DEC STD 012-0
DEC STD 015-0
DEC STD 064-0
DEC STD 073-0
Guidelines
ESDP Style Guide
Producing International Products (PIP) Handbooks
(available in a special edition for third parties that have an agreement with Digital)

Table 3 describes situations in which Digital works with third parties, and indicates whether each situation requires compliance to DEC STD 003.

Table 3: Third-Party Buyouts and DEC STD 003 Compliance

Who designs	Who manufactures	Who sells	Compliance with DEC STD 003
Digital	Third party	Digital	Required
Third party	Third party	Digital	Guideline only
Third party	Third party	Third party	Guideline only

If the third-party documentation already exists, then the documentation group must evaluate the documentation. If the documentation is satisfactory but does not look like other Digital documentation, consider shipping the third-party documentation as is, to save costs. If the documentation is unsatisfactory, then rewrite it following Digital standards.

Digital should also negotiate with the third party for:

- Source files for vendor-generated documentation
- An agreement that if Digital uses the vendor-generated documentation as is, then if the vendor updates the product, the vendor will also update the documentation
- Licenses that provide Digital with the rights to:
  - Change the documentation and source files at will.
  - Distribute the documentation wherever Digital does business.
  - Use any translated documentation as well as the English version.

If you give DEC STD 003 to non-Digital personnel, you must require that the receiving party sign a non-disclosure agreement.

CHAPTER 2

ORGANIZATION, STYLE, AND GRAPHICS

This chapter describes the basic parts of a manual and discusses style considerations. The chapter also covers standards for illustrations.

2.1 Parts of a Document

Most documents are divided into three major parts:

Front matter
Body
Back matter

Hardware documentation must adhere to Table 4, which lists the basic contents of each part. Table 4 also lists the sequence for the contents of documents. The local engineering group may override this sequence.

For More Information

See the following standard and guidelines:

Standard
DEC STD 146-0 Standard Order of Pages in Manuals

Guidelines
ESDP Style Guide
The Chicago Manual of Style *

* The information in this manual may conflict with international requirements. Always refer to Digital standards and guidelines first.

Table 4: Parts of a Document

Manual Part	Conformance	Description
Front Matter		
Information map	Optional (recommended)	The information map provides the reader with a visual path to follow through the documentation set. The map may appear • Before the title page • Before the related documentation page • As a separate document
Title page	Required	Includes the manual's title, document number, and date.
Copyright page	Required	The copyright page contains the publication date, revision history, copyright notice, a list of Digital and third-party trademarks referenced in the text, and any appropriate disclaimers.
Legal or regulatory notices page	As required by law	For documentation used in the U.S., this would include any FCC notice. See *DEC STD 103-0 Electromagnetic Compatibility (EMC) Hardware Design Requirements*. For other countries, refer to that country's regulations. Short notices can be included on the copyright page. At the moment, there is no requirement for countries to delete notices required by another country.
Table of contents	Required	The table of contents lists the page numbers for major headings, figures, tables, and formal examples in sequential order.
Preface "About This ..."	Required	The preface describes the purpose, audience, organization, contents, and approach of the document. The preface also provides a list of conventions used and advises the reader how to use the manual.
Related documentation	Required	This section lists product-related documentation and any other documents referenced in text.
Body		
Information types	Required	This section provides the core information. A hardware document may contain one or more information types, such as installation and operation. Chapter 3 of this standard describes the hardware information types and provides a content outline for each type.

Back Matter		
Appendix	Optional	Appendices provide supplemental information for the reader seeking further clarification. Appendices can also provide detailed specifications, country-specific information, and reference information that applies to several sections of a document.
Glossary	Optional (recommended)	A glossary is an alphabetical list of terms and their definitions.
Index	Required	The index lists the page numbers of all important terms and concepts that a reader might refer to, in alphabetical order.
Reader's Comments Card	Required	The reader's comment card allows readers to send their feedback on the document to the writing group. The card is preaddressed to the appropriate organization and stamped.

2.2 Country-Specific Information

Some information in documents is relevant to only one country, language, or area. For example, the modem compliance notice is specific to every country. This information is often modified or replaced during the localization process. To make the process easier, you should group country- or language-specific information in sections that can be easily extracted.

The following sections of a document often contain information that varies depending on which country the product is sold in:

- **Copyright Page and Trademark List**

  Some publishing tools, such as VAX DOCUMENT, let you use a prepared copyright page or modify the information. Localization groups replace the copyright page with their own prepared local-language version.

- **Reader's Comments Card**

  A reader's comments card allows the documentation group to collect comments from readers on the quality and usefulness of the document. Localization groups may replace the card with their own local version if the document is translated or localized.

- **Regulatory Agencies**

  Notices pertaining to regulatory bodies such as the FCC or the British Standards Institute are country-specific information. The localization group extracts or modifies the notices as required.

- **Safety Requirements**

  Many countries have strict regulations on safety issues such as power, especially the use of high voltage and amperage. These regulations affect the language, size, and location of warnings and cautions. Contact the responsible product safety engineer regarding the use of any safety messages in the documentation.

  Many publishing tools provide a standard method to format warnings, cautions, and notes so that their typographical appearance complies with country-specific requirements. Make sure that you use the appropriate coding for such information, so that translated versions appear correctly.

- **Cabling and Power Requirements**

  Cabling and power requirements often differ from country to country. Refer to the *Producing International Products* (PIP) handbooks and *DEC STD 002-0 AC Power Wiring, Safety Earth Grounding, Plugs and Receptacle Information and Requirements* for more information.

  One possible strategy is to include all possible variants in the source text. For example, a single illustration could show all possible plugs and power outlets.

- **Products that Connect to PTT Lines**

  Standards vary from country to country. This information affects hardware operation, such as the maximum baud rate available. Refer to the PIP handbooks and DEC STD 002-0.

- **Ordering Parts, Options, and Services**

  Place these sections in an appendix, so that worldwide groups can easily extract and replace the information.

  As an alternative, place this information on a single card or sheet that can be supplied with the warranty.

2.3 Style

Style is the manner of expressing content, which involves both the language and visual appearance of your document. There are conventions for many issues of style, such as the use of lists and tables, rules of capitalization, and so on. You can also refer to the following guidelines:

For information on ...	See...
Writing style and usage	DEC STD 015-0 is the only standard that affects style. *Educational Services Development and Publishing Style Guide* This style guide covers spelling and capitalization, use of numbers and abbreviations (per DEC STD 015-0), punctuation, acronyms and mnemonics, cross-references, tables and lists, footnotes, indexing, common usage problems, and more. The ESDP style guide is hardware-oriented.
Internationalization	*Producing International Products (PIP)* The PIP user handbook provides guidelines on writing modular documentation with core text, to make translation easier. The handbook explains how to accommodate text expansion caused by the translation, how to use acronyms and mnemonics, and the proper use of metric units.

2.4 Illustrations

Hardware documents make extensive use of illustrations for installation, operation, and servicing procedures. DEC STD 003-0 focuses on the guidelines for text in hardware documents. There are no corporate standards for preparing illustrations, but you can refer to the following illustrating guidelines:

For guidelines on...	See...
Board art (manually drawn)	*ESDP Site Illustrating Guide*
Online art	*ESDP STD 11: Online Technical Illustrating Standards for Documentation and Courseware*
Translation requirements and supported tools	*Producing International Products—User Information Handbook*
Corporate identity	*Corporate Identity Manual*

CHAPTER 3

INFORMATION TYPES

This chapter describes the document information types used for Digital hardware products. The chapter provides a content outline for each information type.

Information types represent a change in approach from traditional hardware documents. Information types divide information into discrete modules, based on the tasks that a given audience needs to perform.

With information types, all the information for a given task—for example, installation—appears in only one document. The title of a document matches its information type, so there is no confusion about what information that document contains. This approach provides consistency across documentation sets and eliminates the duplication of information.

3.1 Choosing an Information Type

When you plan a documentation set for a hardware product, you must decide who your audience is and what type of information that audience needs to perform their jobs.

For most hardware products, you must provide the information to perform a variety of tasks, such as installation, operation, and servicing. You also must provide reference material, such as programming and technical information.

You should use a task-oriented approach for most hardware documentation. Tests show that task-oriented information is easier to understand, more complete, and helps users to complete tasks faster.

Reference materials often provide more theoretical and conceptual information. You should use reference-oriented information when there are no clearly defined tasks, or when there is a wide audience for the information.

The most effective documentation sets use both task-oriented and reference material. Writers should provide clear links between task-oriented and reference material.

Table 5 lists the types of information that pertain to Digital's hardware products. The table also indicates whether each information type is primarily task-oriented or reference-oriented.

Table 5: Document Information Types

Information Type	Orientation	Description
Hardware Concepts	R	Provides product-evaluation information to customers responsible for planning and acquiring new products.
Site Preparation	T + R	Provides procedures and information needed to plan and prepare a site for the product.
Installation	T	Provides procedures and information required to install the product.
Operator	T + R	Provides operating instructions.
Servicing	T	Provides procedures and information needed to service and maintain the product.
Programmer's Reference	T + R	Provides examples and information about the device hardware that programmers need to program the device.
Technical	R	Provides technical information that customers need to understand the product technology so that they can use the product to its fullest potential. Does not contain proprietary information.
Proprietary Technical	R	Provides technical information that internal Digital personnel need to understand the product technology so that they can support the product to its fullest potential. Contains proprietary information that is not available to customers.
Illustrated Parts Breakdown	R	Provides information that identifies the product's field replaceable units (FRUs) and parts.

T = task-oriented, R = reference-oriented.

3.2 Combining Information Types in a Document

Most hardware documents consist of a single information type, but some documents include two or more information types. The decision on how to organize a document set usually depends on the complexity of the product. Each product has its own unique requirements. Some information types may not apply to a product.

High-end products such as a large VAX CPU often have separate documents for each information type. Low-end products such as a video terminal may group several information types in a single document. For example, one document may include hardware concepts, site preparation, installation, and operator information.

3.2.1 Translation Considerations

Check the internationalization requirements for your product. Some information types may be translated to satisfy local market requirements, while other information will remain in English. Some information is subject to mandatory translation, particularly where customer safety is concerned. Consult the *Producing International Products (PIP)* handbooks, DEC STD 064-0, and the responsible product safety engineer.
Consider the ease and cost of translation before combining information types. Do not combine information that will be translated with information that will not be translated. For example, the installation information for a product is often translated, but technical information may not be translated. If that is the case for your product, do not combine those information types in the same document. If there are overriding reasons for combining those information types, make sure the installation information is a module that can be easily extracted from the other information types.

3.2.2 Guidelines for Combining Information Types

Modularity is very important for internationalization, online documentation, and the re-use of information. If you decide to combine information types:

- Make sure that each information type is a separate module.
- Delete duplicate information. For example, several information types may describe the kinds of services available through Customer Services.
- Place the information types in a logical order. For example, if you combine installation and operation, installation would precede operation.
- Number your chapters sequentially throughout. When you reach a second information type within the same book, do not start again with Chapter 1.

3.3 Titles of Hardware Documents

The title of a hardware document must reflect the name of the product, and the information type(s) it contains. A document can contain a single information type or multiple information types.

If a document contains a single information type, it must have the appropriate title listed in Table 6. For example, a title might be *VTxxx Installation Information*. Hardware documentation must adhere to Table 6.

Table 6: Document Titles

Information Type	Title	Primary Audience
Hardware Concepts	Hardware Concepts	MIS department, CEOs, future users
Site Preparation	Site Preparation Information	Customers and Customer Services
Installation	Installation Information	Customers and Customer Services
Upgrade Installation	Upgrade Information	Customers and Customer Services
Operator	Operating Information	Customers
Servicing	Service Information	Customer Services and Customers

Table 6 (Cont.): Document Titles

Information Type	Title	Primary Audience
Programmer's Reference	Programmer's Reference Information	Customers
Technical	Technical Information	Customers
Proprietary Technical	Proprietary Technical Information	Customer Services
Illustrated Parts Breakdown	Illustrated Parts Breakdown Information	Customer Services and Customers

If a document contains multiple information types, use a combination of the titles in the table. For example, *VTxxx Site Preparation, Installation, and Operating Information* would be the title for a document containing those three information types. If a document contains more than three information types, use only the three major information types in the title.

3.3.1 Using the Information Types

The following sections provide an overview of each information type, with a description of the audience and a typical content outline. The outlines were developed to cover a wide range of Digital hardware products. The outlines establish the minimum requirements for the information type.

To increase the consistency and usability of Digital documents, writers should organize and sequence their documents according to the outlines. The development team for a product must decide which information types are necessary for the product. Then they must decide whether and how to combine information types.

Chapter titles should reflect content. The titles in the outlines may fit most circumstances. If a chapter is very large, you can divide the content into two or more chapters. If chapters are very small, you may be able to combine them. The number of chapters will vary according to the complexity of the product.

Finding the Correct Outline for Your Task

The following table relates the information types to the major tasks associated with hardware products. You can use the table as a guide to find the outline for a particular task you want to describe.

In the table, a **P** indicates the information type in which to place the primary description of a task. An **S** indicates a secondary location, where you may describe the task in less detail. For example, consider the site preparation task. You would place the primary description in the site preparation information type, but you may include some site preparation information in the installation information type.

Figure 1: Information Type Matrix

Tasks Related to Hardware Product	Information Types									
	HC	SP	IN	UI	OP	SV	PR	TM	PM	IP
Evaluate needs (presales).	P									
Prepare the site.		P	S							
Configure the system.			P							
Install the hardware and verify the installation.			P							
Operate the hardware.			S		P					
Troubleshoot problems (for customers).					P					
Troubleshoot problems (for Customer Services and self-maintenance customers).						P	S	S		
Maintain the hardware (removal and replacement procedures).					S	P				
Run diagnostics.			S		S	P				
Write code at the operating system level.							P		S	
Design new hardware and troubleshoot advanced problems.							P	P		
Upgrade and/or expand the hardware.				P						
Identify parts for replacement.						P				P
Integrate OEM equipment with Digital equipment.							P			

HC = Hardware Concepts
SP = Site Preparation
IN = Installation
UI = Upgrade Installation
OP = Operator
SV = Servicing
PR = Programmer's Reference
TM = Technical
PM = Proprietary Technical
IP = Illustrated Parts Breakdown

P = primary location S = secondary location

3.4 Hardware Concepts Information

3.4.1 Overview

This information type provides product evaluation and concept information to the customer's decision makers and users. The purpose is to educate customers about a product, class of products, or architecture, and the customer's role in the work environment.

Hardware concepts information provides the decision makers with the information they need for short- and long-range planning for acquisition of new technologies and products.

Hardware concepts information provides customers and future users with background information about the products, as well as concepts involved in the implementation and use of the products.

This is a special information type, the contents of which are tailored for specific purposes. The outline under Section 3.4.3 shows examples of the type of information that might be included, although the entire outline may not be used for a every book.

3.4.2 Audience

The audience for hardware concepts information includes:

- Chief Executive Officers (CEOs) and persons who are planning their organization's long-range computing strategy.
- Management Information Systems (MIS) personnel and others who provide information to CEOs. These individuals may be responsible for planning the installation and managing the system when installed.
- Managers and engineers who need to know about new products to be introduced to the organization.
- Customers and service personnel who will use and maintain the system in the future.

3.4.3 Hardware Concepts Outline

Front Matter

See Table 4.

1 - Implementation

This chapter describes how the product can be used in the work environment.

Implementing the product in the work environment. Include any restrictions or special considerations such as:

- Required operating systems
- Layered products

2 - Product Introduction

This chapter describes the kinds of information and resources to gather before beginning the planning process for a system. The chapter also provides an overview of the products and services that make up the system.

Preplanning	Describe the steps to take before the planning process. Examples: • Enlist the aid of building designers. • Gather survey tools needed for the planning process.
Planning personnel	Briefly describe the roles and responsibilities of personnel such as the facility manager, heating and ventilation engineer, electrician, and specialized sales support people.
Gathering preplanning information	Describe the information needed to prepare plans. Examples: • Using worksheets • Traffic analysis • Performance requirements • Cost versus benefits • Planning for future growth
Planning tools	Describe what you need and its purpose. Examples: • Floor plans • Measuring equipment • Worksheets
Product Introduction	Provide a general description. Focus on the overall function of the integrated products and services that make up the system.
Choosing the Product	Describe factors to consider.

3 - Architecture

This chapter gives an overview of the development of the applicable architecture, the position of the product in the architecture, and comparisons with other architectures.

How the Architecture Evolved	
Component Description	Describe the components of the architecture. Explain how and where the architecture fits with existing architectures.
Roles of Standards	Describe each architectural standard and its role. Include benefits and features.
Compare and Contrast Architectures	

4 - Product Description

Place chapters that contain specific product information here. Describe the individual system components, including features, benefits, and cabling.

Components	Describe each system component. Include features, benefits, and place in the architecture.
Cabling	Describe any special cabling. Country-specific cabling information should go in an appendix.

5 - Installation

This chapter describes the installation process, any regulatory agency requirements, and any cabling rules or recommendations.

Summary	Summarize the installation process, including cable installation, special site considerations, what can and cannot be done. Do not include the installation procedure.
Regulatory Agencies	Describe any regulatory considerations and restrictions, such as FCC regulations and state and local codes for electricity, fire, building, and noise. Country-specific regulatory agency information should go in an appendix.
Labeling and Installation Maps	Describe the following: • Digital cable and component labeling • Use of installation maps

6 - Configuration

Place chapters here that describe configuration guidelines, rules, topologies, and types of connectivity.

Summary	Summarize architectural and system configuration guidelines that must be followed.
Configuration/Topology: Digital to Digital	Provide descriptions and examples of Digital-to-Digital configurations.
Evaluating and planning the installation	Summarize the requirements for evaluating and planning Digital-to-Digital installations.
Configuration rules	Summarize the rules for Digital-to-Digital installations. Provide sample configurations.
Configuration/Topology: Digital to Multivendor	
Evaluating and planning the installation	Summarize the requirements for evaluating and planning Digital-to-multivendor installations.
Configuration Rules	Summarize configuration rules for Digital-to-multivendor installations.
Types of connectivity	Examples: • Terminal • Information transfer • LAN and extended LAN • WAN
Configuration Solutions	Include sample configurations for a variety of environments and computing needs.

Connection examples	Provide sample configurations showing connections to other Digital equipment and to relevant vendor's equipment and operating systems (IBM, Hewlett Packard, Data General, Sun, Wang, UNIVAC, UNIX, PCs.)
Information transfer	Describe capabilities, features, and benefits for each type of connection.
Special Configurations	Provide sample special configurations that meet special needs such as the environment, equipment, or applications.

7 - Services

This chapter describes the different types of services available for the product—from planning to repair and maintenance.

Service Summary	List and describe each type of service applicable to the product, such as: • Planning • Installation • Support • Performance analysis • Educational • Management services
Qualification and Restrictions	If applicable, describe how the customer qualifies for the different types of services and any restrictions that apply.

Appendices

Planning worksheets
Architectural and product specific symbols
Summary of installation labeling procedures
Summary of system specifications
Quick reference to configurations supported by Digital

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3.5 Site Preparation Information

3.5.1 Overview

This information type presents physical, environmental, and electrical data to help plan the efficient installation of the product.

The first chapter contains site planning information. The second chapter contains system specifications needed for site preparation. The third chapter contains the site preparation procedures for the product.

When planning the site preparation information for a product, remember that generic information already exists. For example, a (EK-CSEPG-MA) *Site Environmental Preparation Guide* is available.

3.5.2 Audience

Site preparation information is for people who select sites and plan for the installation of hardware equipment manufactured by Digital.

3.5.3 Site Preparation Information Outline

Front Matter

See Table 4.

Chapter 1 Site Planning Information

General Product Description
Site Evaluation
- Site evaluation procedures
- Site selection procedures

(For office, computer room, network and VAXcluster environments)

Chapter 2 Site Preparation Specifications

Physical and Environmental Specification
- Temperature and humidity requirements
- Space requirements
- Cabling requirements
- Safety requirements
- Electrical requirements
- Shock and vibration requirements
- General environmental requirements for the product

Hardware Operational Specifications
- General description of the operational environment
- Operational layouts
- Functional specifications for electrical and power
- Special environmental specifications
- Regulatory agency requirements
- Performance requirements or considerations

Chapter 3 Site Preparation Procedure

Product-Specific Guidelines
- Physical procedures
- Performance maximization
- Software requirements

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3.6 Installation or Upgrade Installation Information

3.6.1 Overview

This information type provides the user with the information needed to install a standard hardware item and make it operable. Installations include upgrades to existing products, as well as the integration of Digital hardware with vendor equipment. In some cases, upgrading equipment is a unique task requiring separate documentation.

The installation outline applies to both the installation (IN) and upgrade installation (UI) information types. The outline text indicates when information applies specifically to upgrades. Major sections cover the following topics:

- System description and requirements
- Planning and preparing for the installation
- Performing the installation
- Testing system operation after the installation

Installation information often includes country-specific information, such as:

- Voltage requirements
- Weights and measurements

3.6.2 Audience

Installation information may be for the customer, Customer Services, or both. The audience depends on the complexity of the equipment and the skills required for the installation. Customers who qualify as self-maintenance customers can perform certain installations or upgrades without the assistance of Customer Services.

Requirements for Customer-Installable Products

This standard and *DEC STD 041-0 Customer Installability: Product Requirements* define the requirements for customer-installable documentation. Groups preparing information for customer-installable products are required to work with the support organizations for these products. Refer to DEC STD 041-0 for:

- Additional sources of information for documentation
- The review and validation responsibilities of support organizations

3.6.3 Installation Information Outline

Front Matter

See Table 4.

The preface should clearly state the following information:

- In the "Audience" section, specify whether a self-maintenance customer is expected to perform the installation/upgrade.
- Instruct the reader to review the entire installation document before beginning the installation.

Chapter 1 Product Introduction

This section provides an overview of the system and its components so that users can easily identify all parts and place them in the proper physical relationship to each other.

Product Description	Provide an overview of the functional operation of the hardware product and its main components, attachments, and, when appropriate, include the operating system and other software requirements for the installation. **For upgrades,** describe the following: • Use of the product within the supporting hardware • Expected performance relative to other products • Expected effect of upgrade on system performance
Physical Description	Examples of this information include: • Contents of all packaging • Descriptions of components and parts • Dimensions and weight of the overall product • Detailed illustrations and diagrams to help identify the product and its components **For upgrades:** Provide information to show the placement of the upgrade kit components within the product and the requirements for the upgrade.

Chapter 2 Preparing for Installation

This section contains the information needed to evaluate the requirements for the equipment to be installed. Include a description of final preparations for the installation.

Unpacking	Include the following: • Checklist of items to determine that all parts are included in the packaging • Warnings and cautions related to the following areas: – Static awareness – Weight (Refer to *DEC STD 119-0 Digital Product Safety Introduction and General Requirements* for safety considerations for installing heavy equipment.)
Installation Requirements	Provide information for verifying that all physical and procedural requirements for the installation/upgrade have been met.

Site preparation verification	Minimum requirements: • Product dimensions and weight • Service area dimensions • Air conditioning, power, and environmental requirements • Storage requirements
Tool requirements	
Environmental factors	Briefly discuss any special environmental conditions that have an impact on installation, such as moisture and air conditioning requirements.
Software requirements	List and explain measures needed to ensure proper care, operation, and storage of software items. Examples: • Software backup • Operating system shutdown

Chapter 3 Installing

This section outlines preparatory procedures, the actual installation procedure, and verification of a successful installation.

Setup Information	Provide preliminary procedures such as the system setup and cable connections. **For upgrades,** include the following instructions: • How to configure the upgrade components before installation • How to conduct a system pretest before the upgrade
System setup procedures	
Cable connections	
Power	
Network	
Installation Procedures	Provide the product-specific installation procedures here. For customer-installable equipment (installation or upgrade), always include step-by-step assembly and disassembly instructions and diagrams. Do not use the phrase, ‘‘reverse the steps in the _____ procedure.’’ Always spell out the steps.
Installation Verification	Most installations require the installer to verify the installation. Include the following information: • Verification procedures • Final system check Refer installers to the Servicing chapter if they have problems. **For upgrades,** include instructions to properly dispose of or return replaced or upgraded items.

Chapter 4 Testing

Testing procedures provide the installer with the information needed to start the product, load diagnostic software (if any), perform self-tests, check additional configurations other than the default, and shut the system down.

Power-Up Procedures

Explanation of controls and indicators

Emergency shutdown procedure	
Loading diagnostic software	
System testing and self-tests	
Product Configuration Procedures	Include basic procedures to verify all available operating modes.
Setting product configuration	
Checking product configuration	
Formatting new drives (for upgrades)	
Installing new drivers (for upgrades)	
Power-Down Procedures	

Chapter 5 Moving the Hardware

This section includes information for moving or removing the hardware from its installed location.

Preparing for Storage

Preparing for Packing and Shipping

Chapter 6 Services

This chapter describes the types of service available and how to obtain service. The chapter also provides any other service-related information, such as product-specific services.

General Service	Describe available general service and how to obtain.
Product-Specific Services	Describe specific services for this product.
Handling Problems with Other Vendors	Give guidelines for handling non-Digital problems. Examples: telephone company.
Digital Services Available	Example: Set up and initialization for Remote Diagnostic Service with Digital RDC technicians.

Appendices

Hardware Parts List

Specifications

Error Messages

Interconnect Diagrams

Glossary

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3.7 Operator Information

3.7.1 Overview

This information type tells the end user how to operate and maintain a product. Operator information provides end users with all the information they need to fully use the features of that product. Operator information is usually translated, so refer to internationalization guidelines when organizing this material (Section 1.4).

Operator information often provides sections on site preparation and installation. This outline does not address this information. See Sections 3.5 and 3.6.

3.7.2 Audience

The primary audience is anyone who uses the product being described.

3.7.3 Operator Information Outline

Front Matter

See Table 4.

Chapter 1 Product Introduction

This chapter provides the user with an overall view of the product, including features, requirements, and related hardware and software.

Product Overview	
General description	Include system characteristics and architecture, when appropriate.
Physical description	Include information on system components and specifications, when appropriate.
Functional overview	Provide an overview only. Place the detailed functional description in a separate section later in the chapter.
Feature summary	This section contains a list that briefly describes all product features.
Interfaces	
Software requirements and overview	Describe any software requirements and an overview of what the software provides. (May include Digital-supported operating systems.)
Applications	Describe major standard and optional applications that will work with the product. (Includes only Digital-authored and owned applications.)
Protocol support	Describe protocols supported for use with the product.
Hardware options	Describe available Digital hardware options for the product.
Functional Description	Provide a brief functional description.

Chapter 2 Getting Started

This chapter provides product-specific setup and configuration information that the user may need to get started using the product.

Product-Specific Information

This chapter may include various topics relating to the initial product setup. Examples:

- Hardware setup, user controls, menus, indicators
- Programming information and examples, registers
- Initialization
- Configuration
- Startup

Chapter 3 Using the Hardware

This chapter provides the user with the information needed to use product features. This information may require two or more chapters, depending on the product and the amount of information.

Operating Directions for the Hardware

Appendix C provides sample outlines for this section for various product categories. Typical product categories:

- High-end and mid-range systems
- Low-end systems
- Terminals and monitors
- Peripherals such as tape and disk drives
- Network products

Examples of information that would appear in this section:

- Operating mode descriptions
- Alarm conditions
- System status indicators
- Descriptions of controls and indicators
- Command and response structures
- Booting and restarting (planned)
- Power down (unplanned or emergency)

Chapter 4 Maintenance and Troubleshooting

This chapter contains general maintenance information and troubleshooting procedures that the user can perform. The chapter contains only nonproprietary information.

Maintenance

Safety information

You must include information on customer safety while performing maintenance or troubleshooting.

General user maintenance

Provide product-specific procedures. Examples:

- Cleaning the terminal screen
- Taking care of the keyboard

Preventive maintenance

Product-specific procedures for preventive maintenance by the customer.

Troubleshooting	
Common problems and solutions	Provide a list of common problems and suggested solutions.
Self-tests	How to run or interpret self-tests.
Test procedures	How to perform test procedures.
Diagnostics (Internal/Other)	Include only nonproprietary information.
Field Replaceable Units (FRUs) Procedures	Include only nonproprietary information. This section is optional, based on product marketing or service strategies.

Chapter 5 Services

This chapter describes the types of service available and how to obtain service. The chapter also provides any other service-related information, such as product-specific services.

General Service	Describe available general service and how to obtain.
Product-Specific Services	Describe specific services for this product.
Handling Problems with Other Vendors	Give guidelines for handling non-Digital problems. Examples: telephone company.
Digital Services Available	Example: Set up and initialization for Remote Diagnostic Service with Digital RDC technicians.

Appendices

Examples of typical appendices:

- Error log information
- System messages
- Instructions for peripherals
- Control flags
- Commands
- Accessories and supplies
- Specifications, if not included in the physical description section

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3.8 Servicing Information

3.8.1 Overview

This information type is for Customer Services personnel and customers who perform their own maintenance. Customer Services personnel are those persons who have the appropriate training and experience necessary to perform tasks on equipment service access areas. They are also aware of the hazards to which they are exposed when performing a task and of the the steps required to minimize danger to themselves and to others. If there are questions about service access areas, contact the responsible product safety engineer.

The content of the servicing information document reflects the hardware maintenance philosophy established for the product and the skill level of those required to perform the tasks. In general, the document provides servicing information to perform maintenance at the field replaceable unit (FRU) level.

Servicing information has the following objectives:

- Provide an overview of the operational and functional concepts of hardware, firmware, and software, so Customer Services personnel and self-maintenance customers have a basic understanding of fault isolation and location procedures.
- Summarize the purpose and use of all maintenance aids available for the product. These aids include self-test features, built-in error logging, Symptom Directed Diagnosis tools, and the standard Customer Services tool kit, plus any special tools and test fixtures required. Describe the availability and use of any remote services and online documentation.

  Software resources include maintenance diagnostic/exerciser programs, diagnostic programs and error logging that run under operating system or micro-code control, and related information.
- Review troubleshooting methods and procedures that help to isolate and localize hardware faults, such as:
  - Power-up, self-test, and bootstrap processes
  - Any console commands
  - Operation and error reporting of internal diagnostics
  - Fault isolation procedures.
  - Service diagnostics
- Provide adjustment, removal, and replacement procedures required to perform maintenance tasks.
- Identify and describe tests used to verify system, network, and cluster performance.

The plan for servicing information must be based on the following factors:

- A maintenance plan written by CSSE that defines the field replaceable units (FRUs), levels of repair available in the field, spare provisioning availability, and any alternatives to the primary maintenance plan.
- The target population that will be servicing the product in the field and their skill level. This includes both Customer Service and self-maintenance customers.
- Product maintainability information that describes maintenance aids and self-test features designed into the product, special test equipment requirements, the levels of diagnostic programs for Customer Services and self-maintenance customers.

3.8.2 Audience

The audience for servicing information may include Customer Services and self-maintenance customers.

3.8.3 Service Information Outline

The complexity of the equipment dictates the organization and format of the servicing information. System hardware descriptions generally fall into the following categories:

Modules
CPU
Memory
Adapters
Card cage
Control subsystem assembly
Power subsystem
Cabinet, enclosure, and options
Peripherals

You may present this information as chapters in a document or as separate documents. Many systems have a variety of possible configurations, so modularity is important. With modular sections, you can organize servicing information to match different system configurations.

Front Matter

See Table 4.

Chapter 1 Product Introduction

This chapter provides an overview of product features, including basic hardware operational concepts and how hardware interacts with software.

Physical Description
Functional Description
Controls and Indicators (Describe briefly, and refer the reader to Operator Information.)
Console Commands and Usages (Describe briefly, and refer the reader to Operator Information.)

Chapter 2 Equipment Configuration

This information describes electrical, mechanical, and programming aspects for the desired product configuration.

General
Cabling
Power
Bus Loads
Board Configuration
System Configuration

Chapter 3 Testing and Troubleshooting

This information helps the user quickly diagnose hardware problems and isolate them to a faulty component. The process is based on using the equipment's LED readouts, diagnostic test results, and prescribed equipment procedures.

Diagnostic Overview
Power-up Self-test
Local Self-test
Front Panel Diagnostics
Host Diagnostics
Symptom Directed Diagnosis
Troubleshooting
Fault Isolation Procedures
Error Logging Utility

Chapter 4 Removing and Replacing FRUs

This information describes removal and replacement procedures at the field replaceable unit (FRU) level.

Safety Precautions (Hazards to personnel and equipment)
Remove and Replace Faulty FRUs
Retest to Verify Fix
Adjustments
Repackaging

Chapter 5 Maintenance, Cleaning, and Replacement Cycles

This information describes procedures to perform proper equipment care by the user.

Preventive Maintenance Schedule
Test Equipment, Tools, and Materials Required
Applicable Diagnostics and Exercisers

Standard Appendices

Recommended Spares List
Ordering Information
Software and Diagnostic Support Available

Other Appendices

Formatting Disk Drives
Model Variations
Register Summary
Diagnostic Error Messages
Related Documentation

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3.9 Programmer's Reference Information

3.9.1 Overview

This information type is a companion to the operator information supplied with the hardware. Programmer's reference information describes how to use built-in features (such as escape codes for a terminal or printer) or how to build a device driver.

3.9.2 Audience

There are two distinct audiences for programming information:

- Users who are trying to access a firmware feature
- Software experts who are writing code to incorporate the device within a system

Programmer's reference information should have two main sections, tutorial and reference, to address the different needs of these two audiences.

3.9.3 Tutorial and Reference Information

The *tutorial* section is for an average user trying to access the basic features of the device. Use tutorials as appropriate for the given product.

The tutorial should focus on a single broad example that makes use of most of the device's features. The tutorial must also provide specific information on each feature—what the feature does and how to use it. At the end of the tutorial should be a comprehensive and annotated program that completely implements all the features described in the broad example.

The *reference* section is for the experienced programmer. This section focuses on detailed descriptions of each feature, covering such topics as:

- Function
- Command syntax
- Options, arguments, and parameters
- Limits and restrictions
- Brief example

Normally, these topics are arranged in a template so readers can quickly find the information they are looking for.

There are at least two options for organizing the reference section:

- By function, such as screen commands or character set commands
- Alphabetically by command name or mnemonic

For more information, refer to the organization of documentation for similar Digital devices.

3.9.4 Programmer's Reference Information Outline

Front Matter

See Table 4.

Chapter 1 Product Introduction

Features	
Options	
General Operating Modes	
Specifications Affecting Programmer	Could be in an appendix.

Chapter 2 Using the Device Features (Tutorial)

Introduction	Explain whom this tutorial was written for.
Task	Describe what the device will do in this example.
Physical Setup	Describe the: • Necessary steps • Optional steps • Steps that can be done remotely
Remote Use of Features	Provide the following for each parameter and feature: • Description • Setup • Sequences to use each parameter and feature
Summary: Example	Provide an annotated software example, using all parameters and features.

Chapter 3 Programming for the Device (Reference)

Device Configuration Features	Define each feature.
Local use	Specify how to set each feature locally.
Remote use	Specify how to set each feature remotely.
Modes of Operation	Define each mode of operation.
Inputs	Describe all inputs and their effects.
Outputs	Describe all outputs.
Sequence Descriptions	Describe all sequences that can modify the device's operation. For devices that have emulation or graphics modes, repeat the reference sections for each mode. Also repeat the tutorial section if there are operator features that can be invoked in that mode.

Chapter 4 Error Handling

Appendices

Port Specifications	Include this information only if it cannot be placed in another document that ships with the device. The goal of this section is to provide enough information so that a technical person could develop an interface to the device. Define the following for each port (connector) on the device: Pin assignments Signal names and levels Signal protocols
Standard Charts and Character Sets	Examples: • ASCII • DEC Supplemental Grapic • ISO Latin-1
Alternate Software Examples	Annotate each example.

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3.10 Technical Information

3.10.1 Overview

This information type provides customers with non-proprietary technical data and background on a product's technology so they can use the product to its fullest potential. The title *Technical Information* replaces a number of former titles, such as Technical Manual, Technical Description, and Technical User's Guide.

Do not include sensitive or proprietary information, or trade secrets, in technical information. Instead, use the *Proprietary Technical Information* type to communicate restricted information to Digital personnel.

Use the following guidelines when preparing an outline:

- Products with extensive programming information usually have a separate programmer's reference document. In this case, you do not need to include a programming section in the technical information.
- Do not include installation information in the technical information. The installation information type exists for that purpose.

3.10.2 Audiences

Primary Technical information is for two principal audiences:

- Programmers who write driver or operating system code for the hardware (usually customers)
- Support engineers who troubleshoot complex system problems (usually Digital Customer Services)

Secondary Secondary audiences include customer engineers who design equipment that interfaces to Digital hardware or who integrate Digital hardware into other systems (OEMs).

3.10.3 Technical Information Outline

Packaging Options There are several ways to organize the sections listed in the outline for technical information. For example:

- **Sections within a chapter.** A midrange system may use a single technical document. Each subsystem (CPU, memory, I/O) would be described in its own chapter, and the topics in the outline would be repeated in each chapter.
- **Chapters within a document.** A low-end system or single device document may devote one chapter to each section in the outline. For example, a workstation technical document would have chapters for functional description, diagnostics and so on.
- **Separate documents.** A high-end system may have a series of technical documents for its subsystems. Each document might contain all of the sections in the outline or perhaps be dedicated to a single section (such as functional description).

Front Matter

See Table 4.

Chapter 1 Product Introduction

This chapter briefly introduces the system or subsystem. The chapter describes systems features, options, and system capacity. The chapter also introduces bus protocols (if applicable) and some diagnostic features such as the built-in self-test.

Chapter 2 Physical Description

This chapter describes the system components and electrical interface. The chapter also provides specifications and safety procedures.

Components	Identify all subsystems.
Electrical Interfaces	Describe bus signals. Include special buses, connectors, and various configurations.
Specifications	Include electrical, environmental, and system specifications. These could also be in an appendix.
Safety Warnings	Provide safety precautions and procedures. Include special considerations, such as cabinet interlocks and panel switch locks.
Configuration Description and Rules	Include if applicable. Some products may require a separate section.

Chapter 3 Functional Description

This chapter divides the product into its major functional components and describes each of the major blocks. This chapter was formerly called “Theory of Operation” in some documents.

Subsystem Descriptions	Describe each subsystem, referring to functional block diagrams. For complex systems, divide the major blocks into smaller sections.
Data Flow	Describe how data flows through the system. Examples: read or write operations, data paths on a module, protocols for a bus or a communications device.
Addressing	Describe how data is addressed.
System Initialization	Include information on topics such as the built-in self-test, interpretation of front panel LEDs, registers initialized. Also describe changes in status, such as interrupts.
Firmware Functions	Describe any applicable microcode and the system considerations involved.
Data Structures	Describe any data structures visible to the user, such as the stack.

Chapter 4 Register Descriptions

This chapter covers all hardware and software registers, providing bit-level descriptions of each. The descriptions include the function of each bit or group of bits and how they are set and cleared.

Chapter 5 Diagnostics and Self-Tests

This chapter describes each diagnostic and the built-in self-test, if applicable. Do not describe proprietary diagnostics.

Diagnostics	
Function	Explain each diagnostic individually.
Prerequisites	Explain any prerequisites needed to run the diagnostic.

Chapter 6 Troubleshooting

This chapter describes the troubleshooting methods used to isolate a malfunction to a particular component.

Overview	Describe the basic approach to troubleshooting for this product.
General procedures	Describe any general precautions that apply to all the troubleshooting procedures, such as the use of an antistatic wrist strap
Safety precautions	Describe any safety considerations for personnel and equipment, such as how to remove and replace defective components.
Troubleshooting Procedures	Describe the procedures individually.
LED indicators	List any codes for indicator lights and describe how to use the indicators when troubleshooting.
Diagnostics	Describe how to run appropriate diagnostics and interpret diagnostic listings.

Chapter 7 Error Handling

This chapter describes the methods used for detecting errors.

Error Log	Describe the format of the error log and explain error log entries.
Fault Management Process	Describe the software implementation of the fault management process.
Errors	Describe correctable errors, noncorrectable errors, and fatal errors.

Appendices

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3.11 Proprietary Technical Information

3.11.1 Overview

This information type contains proprietary technical data for Digital personnel that is not shared with customers in order to protect Digital's patents or competitive advantage. Examples include

- Proprietary bus protocols
- Disk communication
- Critical timing
- Detailed memory descriptions

3.11.2 Audience

The audience for proprietary information is usually limited to Digital personnel.

3.11.3 Security

Normally, the security level of this information is *Digital Internal Use Only*. In some cases, information is classified as *Digital Confidential*.

You must follow the requirements for these security classifications per DEC STD 128-0. For example, the security level must appear on each page of the document. Notify the group that distributes the document of the security classification so that they can manage distribution.

3.11.4 Proprietary Technical Information Outline

Packaging Options

There are at least two options for packaging proprietary technical information:

- **Superset of technical information.** The proprietary document could be an expanded version of the technical document. Writers could use conditionalized files to manage both documents.
- **Supplement to technical information.** The proprietary document could be an addendum to the technical document.

The general outline for proprietary technical information is the same as that for technical information. An asterisk (*) indicates proprietary material not included in technical information.

Front Matter

See Table 4.

Chapter 1 Product Introduction

This chapter briefly introduces the product. The chapter describes product features, options, and product capacity. The chapter also introduces bus protocol (if applicable) and some diagnostic features such as the built-in self-test.

Chapter 2 Physical Description

This chapter describes the system components and electrical interface. The chapter also provides specifications and safety procedures.

Components	Identify all subsystems.
Electrical Interfaces	Describe bus signals. Include special buses, connectors, and various configurations.
Specifications	Include electrical, environmental, and system specifications. These could also be in an appendix.
Safety Warnings	Provide safety precautions and procedures. Include special considerations, such as cabinet interlocks and panel switch locks.
Configuration Description and Rules	Include if applicable. Some products may require a separate section.

Chapter 3 Functional Description

This chapter divides the system or subsystem into its major functional components and describes each of the major blocks. This chapter was formerly called “Theory of Operation” in some documents.

* The chapter should include detailed descriptions of any proprietary architectures, unique addressing schemes, dedicated bus structures, and so on.

Subsystem Descriptions	Describe each subsystem, referring to functional block diagrams. For complex systems, divide the major blocks into smaller sections.
Data Flow	Describe how data flows through the system. Examples: read or write operations, data paths on a module, protocols for a bus or a communications device.
Addressing	Describe how data is addressed.
System Initialization	Include information on topics such as the built-in self-test, interpretation of front panel LEDs, registers initialized. Also describe changes in status, such as interrupts.
Firmware Functions	Describe any applicable microcode and the system considerations involved.
Data Structures	Describe any data structures visible to the user, such as the stack.

Chapter 4 Register Descriptions

This chapter covers all hardware and software registers, providing bit-level descriptions of each. The descriptions include the function of each bit or group of bits and how they are set and cleared.

Chapter 5 Diagnostics and Self-Tests

This chapter describes each diagnostic and the built-in self-test, if applicable. * Include proprietary diagnostics, such as those used to test fault-tolerant systems.

Diagnostics	
Function	Explain each diagnostic individually.
Prerequisites	Explain any prerequisites needed to run the diagnostic.

Chapter 6 Troubleshooting

This chapter describes the troubleshooting methods used to isolate the malfunction to a particular component. * The chapter should describe any proprietary tools.

Overview	Describe the basic approach to troubleshooting for this product.
General procedures	Describe any general precautions that apply to all the troubleshooting procedures, such as the use of an antistatic wrist strap
Safety precautions	Describe any safety considerations for personnel and equipment, such as how to remove and replace defective components.
Troubleshooting Procedures	Describe the procedures individually.
LED indicators	List any codes for indicator lights and describe how to use the indicators when troubleshooting.
Diagnostics	Describe how to run appropriate diagnostics and interpret diagnostic listings.

Chapter 7 Error Handling

This chapter describes the methods used for detecting errors. * Describe any special ECC techniques designed into the product.

Error Log	Describe the format of the error log and explain error log entries.
Fault Management Process	Describe the software implementation of the fault management process.
Errors	Describe correctable errors, noncorrectable errors, and fatal errors.

Appendices

Glossary

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3.12 Illustrated Parts Breakdown (IPB)

3.12.1 Overview

An illustrated parts breakdown (IPB) is basically a hardware parts catalog for a particular product. The IPB provides a set of illustrations and corresponding parts lists to locate and identify all parts and assemblies.

The objective of an IPB is to cover the entire parts complement for the specified device, following the organization and nomenclature of engineering drawings. IPBs provide a record of each Digital hardware system and option. IPBs are available in online, hardcopy, and microfiche format.

3.12.2 Audience

The audience for IPBs includes internal and external groups:

- Inside Digital

  Customer Services
  Depot-Level Maintenance
  Part Number Assistance Hot Line
  Logistics
  Manufacturing

- Outside Digital

  Self-maintenance customers
  OEMs

3.12.3 Outline

The following pages show a title page, illustration, and corresponding parts list from an IPB. The title page provides instructions on how to use the IPB.

Each parts list is keyed to an exploded-view drawing. The parts list uses an indented format to indicate the subordination of parts and assemblies. The IPB provides the following information:

Item description
DEC or vendor part number
ECO history
References to related figures in the IPB or other IPBs

The IPB also provides a Part Number/Description Sort section. Parts are sorted both numerically and alphabetically by part number and description. This section serves as an index, referring the reader to a figure and item number for each part.

Figure 2: IPB Title Page

digital™

EK-SA600-IP-001

ILLUSTRATED PARTS BREAKDOWN

SA600
STORAGE ARRAY

HOW TO USE THE IPB

GENERAL
This IPB is compiled following the organization and nomenclature of the engineering drawing structure.

MAJOR ASSEMBLY LOCATOR (When Applicable)
The Major Assembly Locator (first illustration) is an index that provides a description and a figure reference for all illustrations used in this manual.

INDENTED PARTS LIST
This manual identifies each assembly being broken down (figure reference callout), and all parts of that assembly. Further breakdown of an assembly is shown by an asterisk (*) preceding the item callouts in the Description Column. The number of asterisks preceding an item is used to denote the subordination of that item with respect to the Major Assembly. A single asterisk preceding an item description indicates that the item is part of the major assembly being illustrated. Items that are subordinate to single asterisks items, are denoted by two asterisks (**) and immediately follow the related single asterisk item. This system of part identification provides a means for the user to identify the next higher assembly item and make alternate selections for parts when the required replacement part of assembly is not immediately available.

COLUMN CALLOUT DESCRIPTION
Figure and Item – Indicates the figure number and item number of each part.

Description – Lists the name of the part and pertinent specifications (when required). Asterisks preceding the description denote the subordination of the part to the next higher assembly.

DEC Part No. – Lists the Digital part ordering number. A blank in this column indicates a Digital part number was not assigned at the time of publication.

ECO Cut-In – The notation at the top of this column indicates the ECO level of the system (option), at which the IPB was initially prepared. Subsequent ECO level designations, that modify existing parts or add new parts to the device, are inserted in the ECO Cut-In column next to the part that is added or modified.

Used On Code – Letters in this column correspond to the variation codes assigned in Figure 1. Parts with an Alpha notation(s) are used only in those option variations. A blank indicates that the part is used on all option variations.

Ref Fig No. – A cross reference between illustrations. For each Major Assembly, the number in this column denotes the figure of the next higher assembly. For all subassemblies, the number in this column denotes the figure showing additional detailed breakdown.

PART NUMBER/PART DESCRIPTION SORT SECTION
Parts are sorted both numerically and alphabetically by description, referenced to a location within the IPB, by figure number and item number.

REVISION HISTORY

PRINTING	ECO LEVEL		DATE	OTHER IPB MANUALS REFERENCED
1st Printing	SA600-X 70-24444 70-24442	00002-00004 00002-00004 00002-00004	31-AUG-89	EK-0RA90-IP

Figure 3: IPB Exploded-View Drawing

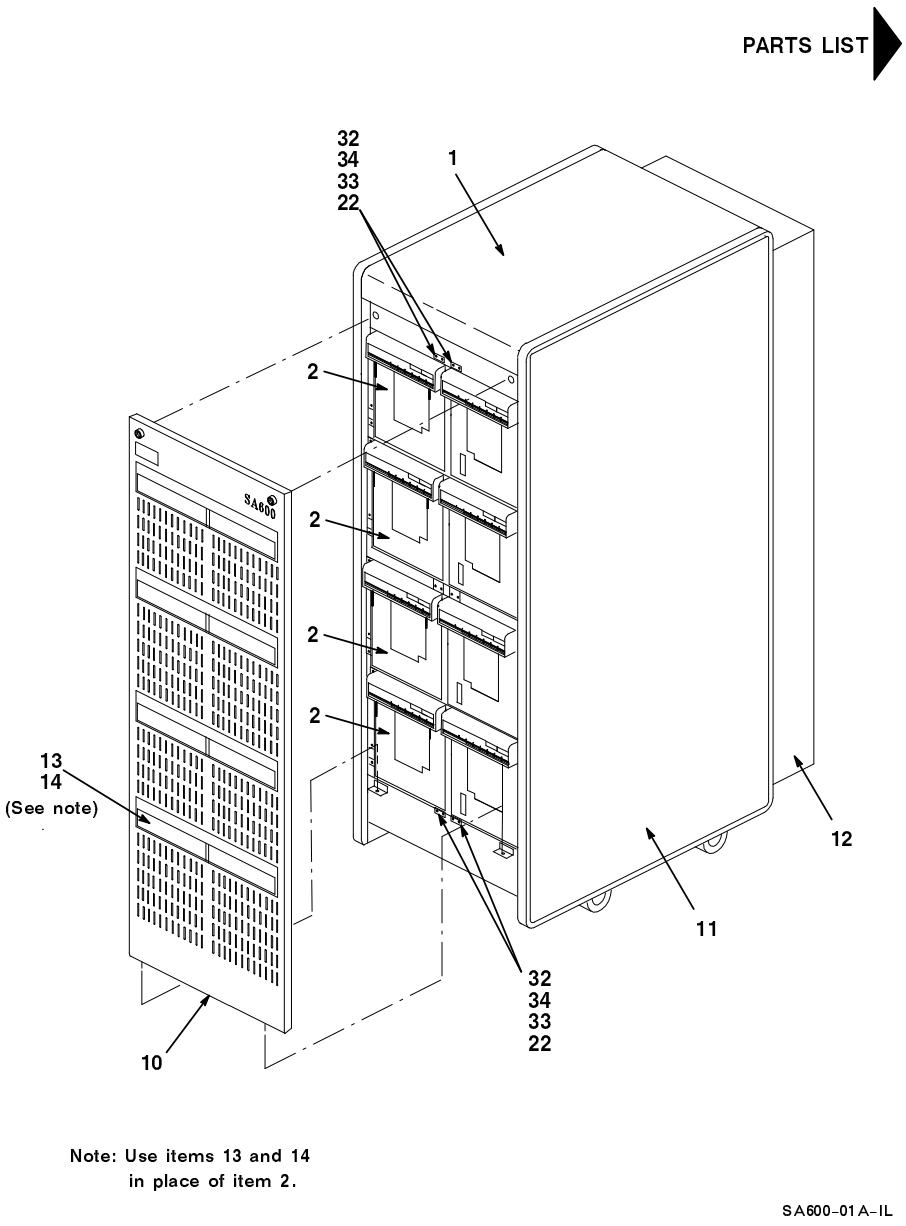

Figure 1. SA600 Drive/Cabinet Assembly (Sheet 2 of 6)

Figure 4: IPB Parts List

FIG.& ITEM NO.	DESCRIPTION	E DEC PART NO.	ECO CUT-IN SA600-X 00002	USED ON CODE	REF FIG NO.
1-	SA600 DRIVE/CABINET ASSEMBLY				
	Code A - Used on SA600-CA (1-RA90 120V)	SA600-CA	00004	A	
	Code B - Used on SA600-CD (1-RA90 240V)	SA600-CD	00004	B	
	Code A - Used on SA600-FA (2-RA90 120V)	SA600-FA		C	
	Code D - Used on SA600-FD (2-RA90 240V)	SA600-FD		D	
	Code E - Used on SA600-HA (4-RA90 120V)	SA600-HA		E	
	Code F - Used on SA600-HD (4-RA90 120V)	SA600-HD		F	
	Code G - Used on SA600-JA (8-RA90 120V)	SA600-JA		G	
	Code H - Used on SA600-JD (8-RA90 240V)	SA600-JD		H	
1	*Cover, Single Width 60 Inch Cab Top	H9544-LB			
2	*RA90 Disk Drive Assembly (See Note)	70-23899-01			
3	*Screw, Self Tap Truss Hd No. 10-32 x 1/2	90-00063-39			
4	*Washer, Lock	90-06637-00			
5	*Screw, Shoulder Socket Hex Hd No. 1/4 x 3/16	12-24007-02			
6	*Rail Assembly, Chassis	70-25686-01			
7	*Bracket Assembly, Rail	70-25687-01			
8	*Bar, Insert Nut	74-36464-01			
9	*Screw, Phl Flat Hd No. 10-32 x 3/4	90-00039-02			
10	*Door Assembly, SA600	70-23920-01			
11	*Panel Assembly, 60 Inch w/o Ground Strap	70-16699-02			
12	*BUSTLE KIT ASSEMBLY (SA)	70-24444-03			2
12A	*Plate, Bottom Cover (deleted) (Not Shown)	74-37081-01	00003		
13	*Bezel, Control Panel Filler (Not Shown)	74-36858-01		A-F	
14	*Screw, Self Tap Phl Flat Hd No. 4-20 x 3/16	90-10411-01		A-F	
15	*Clamp, U-Clip Adhesive Backed Cable	90-09771-04			
16	*Cable Assembly, ESD Wrist Strap	12-24023-02			
17	*Mount, Adhesive Backed Cable Tie	90-08264-00			
18	*Tie, Cable	90-07032-00			
19	*Frame Assembly, 60 Inch	70-22965-03			
20	*Retainer, U-Nut No. 10-32	90-07786-00			
21	*Controller, Power 120V 3 Phase 9 Outlet	881-A		ACEG	
	*Controller, Power 220/240V 3 Phase 9 Outet	881-B		BDFH	
22	*Screw, Phl Flat Hd No. 10-32 7/16	90-00039-27			
23	*Weldment, Bustle Support/Locking	70-24891-01			
24	*Screw, Sems Slot Hex Hd No. 1/4-20 x 3/4	90-09988-14			
25	*Bar, End Panel Locking	74-36150-01			
26	*Nut, Wing No. 10-24	90-10848-01			
27	*Bolt, Round Hd 1/2 Inch Carriage	90-10849-01			
28	*Cord, Power 9' 15A (Drive to Power Controller)	17-00442-19			
29	*Cable Assembly, Shielded Sl 93 Ohm 5-1/2 Ft. (Drive to I/O)	17-01482-01			
30	*Panel, I/O Recessed	74-36165-03			
	NOTE: See IPB Manual EK-0RA90-IP.				

CHAPTER 4

UPDATING INFORMATION

Hardware documentation must adhere to the following three methods of updating hardware information:

Update Method	Part Number Code	Description
Revision	–	Replaces the current version of an existing document.
Release Notes	RN	Ships with a new document.
Update package	UP	Ships with an existing document. May also be available separately, for customers who already have the existing document.

When choosing between a revision or an update, consider the following points:

- First, consider how much material you are changing or adding to the document. Section 4.1.1 provides percentage guidelines on when to consider doing a revision.
- Determine where you are in the product's life cycle. If you are near the end, it may make more sense to do an update package than a revision.
- Weigh the relative costs against your audience. For example, if possible, revise customer information rather than using release notes or an update package. Use an update package for field information.

4.1 Revisions

A revision is a new version of a document, replacing the existing version. A revision incorporates new or changed product features, restrictions and known problems. A revision also allows you to correct any documentation errors from the previous version. You must also revise the part number of the document (see Section 1.6).

The planning information in Chapter 1 also applies to revisions. For documents that may be translated, make sure to keep international groups informed about your revision strategy .

4.1.1 When to Revise

Revisions occur early in the product's life cycle, usually within the first 18 months. Normally, the new and changed material should amount to at least 10 percent of the existing document before you consider doing a revision. The following table lists the thresholds for different information types. If you have a smaller number of critical changes, you may consider revising a small document or doing an update package for a larger document. The decision also depends on costs and the audience.

Generally, because of the cost considerations, customer and proprietary technical information should be handled as an update package, and not revised.

Information Type	Minimum Changes to Justify a Revision
Hardware Concepts	10%
Site Preparation	10
Installation	10
Upgrade Installation	10
Operator	10
Programmer's Reference	10
Servicing	25
Technical	30
Proprietary Technical	30
Illustrated Part Breakdown	25

4.1.2 Publishing Information

Revisions normally use the same format, packaging, and binding as the document they are replacing. For bound documents, the type of binding may change if the page count is much higher than the original. See DEC STD 073-0 for specifications.

When planning a revision, contact Publishing and Circulation Services (P&CS) at least 13 weeks before sending them the new master for printing. P&CS works with a 13-week inventory. If you provide 13 weeks notice, P&CS assumes the costs for disposing of the remaining stock for the earlier version. Let P&CS know if it is acceptable to deplete stock before going to a new version. Helping to manage inventory for documentation is an important cost-saving factor for Digital.

Part Numbers: The revision number of a document appears in field four of the standard 2-5-2.4 part number (see Section 1.6). The first version of a document has a revision of A01. When the document is revised, the revision becomes B01 and the 2-5-2 portion remains the same. For example, EK-LPS40-IN.A01 will become EK-LPS40-IN.B01.

Note that P&CS Inventory Control may change the numerals inside the revision to reflect certain changes that have no impact on the content of the documentation, such as a change of wrapping or print stock. This is not considered to be a new version of the documentation, but it is considered as a new revision of the part number. All such changes must conform to the controls and requirements defined in DEC STD 012-0.

4.2 Release Notes and Update Packages

Release notes and updates are issued for the same reasons as a revision – new or changed product features, restrictions, known problems, and documentation errors. Section 4.1.1 lists the minimum number of changes that justify a revision. If you have fewer changes, you should do an update package. You should also do an update rather than a revision if the product is late in its life cycle.

Release notes and updates have a part number separate from the original part number.

Release notes and updates are packaged with the product documentation, so they use the same format and binding method as the documentation. See DEC STD 073-0 for binding options.

For unbound documents, customers can remove old pages and insert updated pages.

4.2.1 Release Notes

Release notes accompany a new document at the first revenue ship (FRS) of a product. Release notes usually contain two types of information:

- **Last-minute additions or changes to product features and documentation.** These are changes and additions received too late in the publishing cycle to be incorporated in the standard documentation. If the documentation is revised later, you should incorporate this information and discontinue the release notes.
- **Product bugs, anomalies, and workarounds.** This is highly technical information that must be documented in order to avoid damaging a customer's equipment, data, or process. This information has no logical place in any of the standard information types. When the bugs are fixed (for example, by an ECO), you can discontinue the release notes.

Part Numbers

Release notes use a code of *RN* in field 3 of the standard 2-5-2.4 part number. Example: EK-LPS40-RN.A01.

4.2.2 Update Packages

Update packages may provide a list of annotated changes or a set of replacement pages, depending on the binding of the existing document. The update package may also be available separately, for customers who already have the existing document. For customers who do not have the existing document, the update package is shrinkwrapped to the existing document.

- If the document is bound, the update package provides annotated changes.
- If the document is in a binder, the update package provides replacement pages that the user can insert. The update package provides instructions on where to insert pages.

Part Numbers

Update packages use a part code of *UP* in field 3 of the standard 2-5-2.4 part number. Example: EK-LPS40-UP.A01

4.3 Samples

Appendix A provides some brief samples of release notes and an update document.

APPENDIX A SAMPLE RELEASE NOTES AND UPDATE

This appendix provides brief samples of two methods described in Chapter 4 for updating documents—release notes and update packages.

VAX 6000—400 Release Notes

Order Number EK–640AA–RN.REV A01

This document covers the hardware release notes for the VAX 6000—400 System, and is intended for use by Digital field service representatives, self-maintenance customers, and technical system managers.

digital equipment corporation
maynard, massachusetts

First Printing, July 1989

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VAX 6000—400 Release Notes

This document covers the hardware release notes for the VAX 6000—400 System.
The sections include:

- LA75 Console Printer Paper Requirement
- Running Programs in Console Mode that Lower Interrupt Priority Levels
- KA64A Internal Processor Registers
- Restrictions When Writing Exception Handler Code

1 LA75 Printer Paper Requirement

If the LA75 console printer runs out of paper and certain printer characteristics are set, the system may appear to hang and show a self-test failure. You will not be able to operate the console terminal. To solve, load paper, set terminal setup parameters, and press the printer Ready button.

This condition occurs when both Auto Print mode and XOFF are enabled as printer characteristics, the printer runs out of paper and the system reboots, initializes, or runs self-test.

The LA75 printer is recommended as the console printer connected to the console terminal. When the system reboots, initializes, or runs certain diagnostics, system self-test is invoked. Results from the self-test stream to the printer queue. If the printer is out of paper, the queue fills and the console terminal hangs and generates a self-test failure on the module LEDs.

To solve, load paper and press the printer Ready button.

If the printer does not resume printing, select Auto Print from terminal setup mode. Exit from setup mode. Printer should resume printing.

2 Running Programs in Console Mode that Lower Interrupt Priority Levels

If you run a program in console mode that lowers the interrupt priority level (IPL), for correct program execution you must issue an INIT command prior to starting that program. The INIT command clears any pending interrupts in the processors that may have been generated by active VAXBI devices.

The only Digital programs that you run in console mode that lower the interrupt priority level (IPL) are the ROM-based diagnostics. Any custom applications (such as a non-Digital operating system) that run in console mode may also lower the IPL.

If you shut down your operating system, enter console mode and do not issue an INIT command, and then start the ROM-based diagnostics monitor program, you may receive a failure running ROM-based diagnostics. If you receive an error in this test, initialize the system using the console command INIT and then re-enter the ROM-based diagnostic monitor program. Run your tests again.

This error condition occurs when the operating system has been running and is shut down. The boot processor stops as the system enters console mode and the console prompt is displayed. However, the VAXBI devices continue operation and may issue an interrupt at IPL 14, 15, 16 or 17. The console program operates at IPL 31, the highest level, and will not be affected by these pending interrupts.

Issuing the INIT command clears the processors of pending interrupts. If you run a program that lowers the IPL below the level of any pending interrupt and have not issued INIT, your program will field any pending interrupts generated by the VAXBI devices as input.

If you enter console mode and are not running any ROM-based diagnostics or custom applications in console mode, then you will not encounter this condition. When you reboot the operating system, rebooting automatically initializes the system and clears away any pending interrupts before the operating system is invoked.

3 KA64A Internal Processor Registers

The KA64A processor implements a subset of the internal processor registers implemented by other VAX processors. Programs accessing any unimplemented registers may cause an operating system failure when executed on the VAX 6000—400 system.

Programs accessing unimplemented registers may cause an operating system failure when executed on the VAX 6000—400 system. Under the VMS operating system, the failure will be either a UNEXPIOINT (unexpected I/O interrupt) or ASYNCWRTERR (Asynchronous Write Error) bugcheck.

Crashes caused by accessing one of these registers can be identified by the presence of XMI timeouts. These timeouts are indicated by error bits in XMI registers: the transaction timeout (TTO) bit in the XMI bus error register; or the BUS_ERROR bit in the PCSTS internal processor register (internal processor register 127 (decimal), or 7F (Hex)).

The following processor registers are in the Architecturally Defined Internal Processor Registers table of the *VAX Architecture Reference Manual* and are among those not implemented on the KA64A:

Name	Decimal	Hex	Description
NICR	25	19	Next Interval Count Register
ICR	26	1A	Interval Count Register
PME	61	3D	Performance Monitor Enable

See the machine check and hard error interrupt error parse trees in the *VAX 6000—400 Mini-Reference*, Section 4.4, and detailed description in the *VAX 6000—400 System Technical User's Guide*. A complete list of the IPRs implemented on the KA64A processor is found in these two manuals. Any register that is listed as Reserved is not implemented, and could cause these system crashes when accessed.

4 Restrictions When Writing Exception Handler Code

If you are writing a custom operating system, any F-chip instructions must appear after the fifth instruction in the exception handler code. This rule applies only to operating system exception handlers, not to interrupt handlers or user software programs.

Because VMS and ULTRIX operating system exception handlers do not have floating point instructions in their first few instructions, this problem should never been seen operating under VMS or ULTRIX. The problem could occur under certain, very rare circumstances causing incorrect results for floating point instructions executed as one of the first five instructions in an exception service routine. Interrupt handlers and user software are not affected.

The exception only happens under the following conditions:

1. The F-chip receives a DIVF3, DIVD3, or DIVG3 opcode and the first two operands. It then starts calculating.
2. The DIV instruction is aborted.

   The only way a floating point processor instruction can be aborted is if the instruction stream is changed by a processor exception. This occurs only if the processor encounters an access violation fault, a translation not valid fault, or a machine check while processing the third operand of the DIVx3 instruction.

   In order for another instruction to abort the DIVx instruction, the first or second instruction of the fault handlers must be a floating point instruction. Also, this instruction as well as the fault's SCB vector must be cached in the primary cache, and all exception-processing related page faults must be satisfied by the translation buffer.

   The arrival of another floating point instruction of any type causes the abort (this includes the MULL instruction, which is processed by the floating point processor). This instruction must arrive on exactly the 10th (for DIVF), 21st (for DIVD) or 20th (for DIVG) cycle after the last DIVx operand is sent to the floating point processor and before a request for result is sent to the floating point processor.

3. The floating point processor receives the opcode and all operands for the new instruction and begins calculating.
4. The results of the new instruction are corrupted by leftover state from the first DIV instruction.

To avoid this problem, the operating system exception handler must not have any F-chip instructions within the first five instructions.

KRQ50-SF Installation Update

This document is an update to the *KRQ50-SF Q-bus Controller Option Installation Guide*, EK-KRQ50-IN.REVA01

External I/O Cable Added to Option Kit

The KRQ50-SF option kit now includes an external I/O cable, shown in following figure. The external I/O cable connects the KRQ50 module to the RRD40 disc drive.

The following figure and table replace Figure 2-1 and Table 2-1 on page 5 of the installation guide:

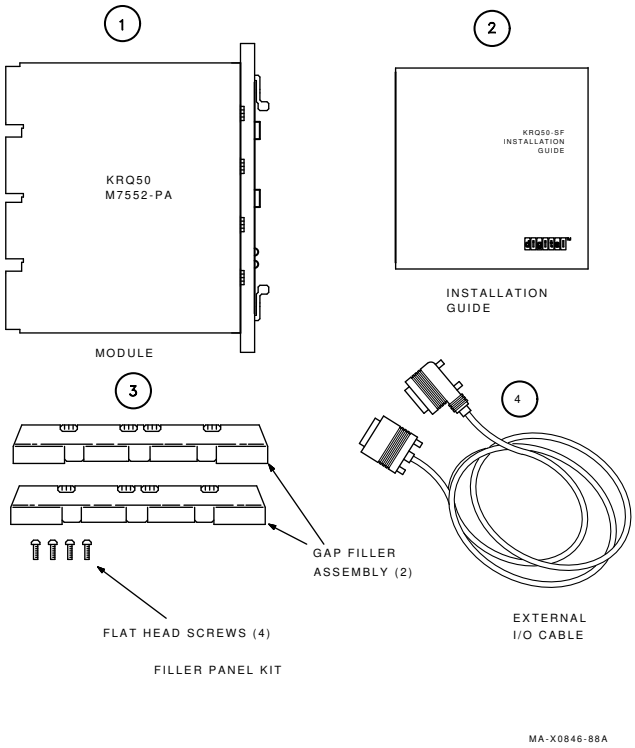

Figure 1 KRQ50-SF Option Kit Contents

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Table 1 KRQ50-SF Option Kit Checklist

	Part Description	Part Number
❶	KRQ50-S Q-bus to RRD40 adapter module	M7552-PA
❷	Installation guide	EK-KRQ50-IN
❸	Gap filler assembly, consisting of a gap filler and two flathead screws	70-24505-01
❹	Cable, external I/O	BC16V-12

Installing the External I/O Cable

Install the cable after you complete the testing procedures on page 26 of the installation guide.

After you test the installed KRQ50 module successfully, you must connect the BC16V external I/O cable from the module to the RRD40 disc drive. Install the external I/O cable as follows:

1. Examine the external I/O cable. One end of the cable has a connector set a 90 degree angle. This is the connector for the KRQ50 module.
   - If this is the first RRD40 disc drive being connected to the KRQ50 module, connect the cable to the top connector (disc drive A) on the module. See Figure 1-2 in the installation guide.
   - If this is the second RRD40 disc drive being connected to the KRQ50 module, connect the cable to the bottom connector (disc drive B) on the module.
2. Tighten the thumbscrews on the cable.
3. Route the other end of the cable to the RRD40.
4. Connect the cable to the rear of the RRD40 and tighten the thumbscrews.

APPENDIX B WAIVERS

The DEC STD 003 waiver process serves two purposes:

1. To let each individual documentation group know when it is deviating from the standard
2. To let the DEC STD 003 committee know what exceptions are occuring that indicate a possible need to revise the standard

Each publication group must decide how it will implement DEC STD 003 and ensure compliance. As part of the implementation, each group should set up a waiver process. Thus, there is no single DEC STD 003 waiver process. Instead, the process is determined by each individual documentation group.

Waivers must be requested for exceptions to any of the following sections of DEC STD 003:

Security of Information	Section 1.3 (Use the DEC STD 128-0 waiver process.)
Packaging and binding	Section 1.6.1 (Use the DEC STD 073-0 waiver process.)
Part numbers	Section 1.6.2 (Use the DEC STD 012-0 waiver process.)
Parts of a document	Section 2.1
Titles of hardware documents	Section 3.3
Updating information	Chapter 4

Waiver requests should include:

Date
Requester
DTN
Mail address (node)
Organization
Document title
Requested exception(s)
Justification

To help keep DEC STD 003 current, please send a copy of all waiver requests and decisions to the DEC STD 003 mail account (**BOOKS::003WAIVER**).

The DEC STD 003 waiver process addresses exceptions to this standard only. For deviations to DEC STD 073-0 (the packaging standard), use the DEC STD 073 waiver process. Likewise, for exceptions to other standards referenced in DEC STD 003, use the waiver process described in those standards.

APPENDIX C SAMPLE "USING THE HARDWARE" OUTLINES FOR DIFFERENT PRODUCT TYPES

The “Using the Hardware” section may comprise one or more chapters, depending on the product. This section presents some sample outlines for different types of products, with a suggested number of chapters for each type. These outlines are only samples, not standards that must be followed.

Example 1 - High-End and Midrange Systems (Three Chapters)

Controls and Indicators
- Control panel
- Keys and switches
- Restart button
- Status indicator lights
- Circuit breaker and power indicator lights

Booting
- How booting works
- Boot devices
- Initial boot procedure
- Regular boot procedure
- Boot processor selection
- Booting from various media

Console Operation
- Description of console
- Console mode
- Console command language control characters
- Console command language syntax
- Command list and descriptions

Example 2 -Low-End Systems (Multiple Chapters)

Using the Hardware
- Switch settings and indicators
- Turning on the system
- Booting the system
- Using the system
- Turning off the system
- Halting the system
- Restarting the system
- Resetting the system

Using System Options
- Mass storage options
- Communication controller options
- Realtime options
- Printer options
- Adding new options

Example 3 - Tape and Disk Drives (One Chapter)

Using the Hardware
- Care and handling (tapes, diskettes, cartridges, and so on.)
- Backing up files
- Loading and unloading (tapes, diskettes, cartridges, and so on.)

Example 4 - Terminals and Printers (Multiple Chapters)

Set-Up
- Entering and leaving set-up
- Changing and saving set-up
- Set-up features

Composing Characters
- Terminal fallback facility (TFF)

Selecting Print Modes
- Supported character sets

Connecting a Modem

Example 5 - I/O Controller (Multiple Chapters)

Command and Response Structure
- Control and status registers
- Input command overview
- Output response overview
- Input commands
- Output responses

Programming Techniques
- Command/response discipline and handshaking
- Start-up
- Criteria for determining parameters
- Error counter access
- Error recovery procedures
- Maintenance register emulation

Aspects of microcode operation
- Polling algorithm
- Error counters
- Microcode internal database overview

APPENDIX D REFERENCED DOCUMENTS

D.1 EL-Class Digital Documents

EL-Class Number	Document Title
EL-00002-00	*DEC STD 002-0 AC Power Wiring, Safety Earth Grounding, Plugs and Receptacle Information and Requirements*
EL-00012-00	*DEC STD 012-0 Part Identification Standard*
EL-00015-00	*DEC STD 015-0 Abbreviations and Units of Measurement*
EL-00028-00	*DEC STD 028-0 Phase Review Policy*
EL-00041-00	*DEC STD 041-0 Customer Installability: Product Requirements*
EL-00064-00	*DEC STD 064-0 Compliance with International Language Requirements*
EL-00073-00	*DEC STD 073-0 Manufacturing and Packaging for Publications*
EL-00103-00	*DEC STD 103-0 Electromagnetic Compatibility (EMC) - Overview and Process Requirements*
EL-00119-00	*DEC STD 119-0 Digital Product Safety - Introduction and General Requirements*
EL-00128-00	*DEC STD 128-0 Security Classifications for Engineering Intellectual Property - Policy and Regulations*
EL-00146-00	*DEC STD 146-0 Standard Order of Pages in Manuals*
EL-00197-00	*DEC STD 197-0 Legal Requirements and Guidelines for Digital Publications and Software*
EL-00490-00	*Trademark Handbook for Digital Employees: Guidelines for Using Trademarks*
EL-00490-01	*Trademark Handbook for Digital Employees: Digital Trademarks List*
EL-00490-02	*Trademark Handbook for Digital Employees: Third-Party Trademarks List*
EL-CP356-00	*Corporate Phase Review Process Guide*

Use VTX SMC to order copies of EL-class documents from Standards and Methods Control. Send distribution questions to JOKUR::SMC or call DTN: 234-4423.

D.2 Other Digital Documents

Document Number	Document Title
	Corporate Identity Manual
	Educational Services Development and Publishing Style Guide
	ESDP Standard 11: Online Technical Illustrating Standards for Documentation and Courseware
	Producing International Products (PIP) Handbooks

APPENDIX E RELATED DOCUMENTS

E.1 EL-Class Digital Documents

EL-Class Number	Document Title
EL-00009-01	*DEC STD 009-1 Product Engineering Specifications: Electrical, Physical, and Environmental Parameters*
EL-00060-00	*DEC STD 060-0 Design of Hardware Products to National and International Regulations and Standards, Policies and Procedures*
EL-00117-00	*DEC STD 117-0 Print Sets*
EL-00132-00	*DEC STD 132-0 Customer Services Product Safety and Liability Policies and Procedures*
EL-00165-00	*DEC STD 165-0 Standard for Documentation Symbology*
EL-00178-05	*DEC STD 178-5 Marking Symbology*
EL-00178-08	*DEC STD 178-8 General Shipping Documentation and Container Labeling Requirements for Finished Goods Intended to be Shipped to Customers*

Use VTX SMC to order copies of EL-class documents from Standards and Methods Control. Send distribution questions to JOKUR::SMC or call DTN: 234-4423.

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